Charles University

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MASTER'S THESIS

The Association between Firm Characteristics and Access to Financein SMEs: Cross Country Evidence from Europe

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Declaration of Authorship

The author hereby declares that she compiled this thesis independently, usingonly the listed resources and literature, and the thesis has not been used to obtain a different or the same degree.

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Prague, May10, 2018 _____ Signature

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Abstract

The Small and Medium Sized Enterprises (SMEs) carry a significant weight in the European economies with their share in number of enterprises, total employment and value added being very substantial. These firms are the major source of new employment generation and they also actively participate in international trade activities. However, these firms face important challenges in doing business like finding customers, availability of skilled labor force, cost of inputs and access to finance. This thesis investigates the issue of access to finance for SMEs in Europe using a cross-country survey data set. Specifically, the possible association of three firm characteristics, namely age, size and exporter status, with access to finance will be examined using quantitative methods. Moreover, given the rich set of countries, how the country conditions like financial deepening, the sovereign debt crises and investment-saving imbalances affect these associations will be studied in detail. Overall, this thesis is expected to contribute to the relevant literature, by displaying the effects of firm characteristics on access to finance for SMEs and the cross-country differences with important implications for related economic policies, and to provide suggestions which can be taken into account by policymakers as possible feasible solutions to ease the problem.

JEL Classification	E44, G30, G31, G32
Keywords	SMEs, access to finance, credit constraints, Europe, financial policy

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The Association between Firm Characteristics and Access to Finance: Cross Country Evidence from Europe

Motivation:

Small and Medium Sized Enterprises (SMEs) are the backbones of economies with their high share of employment generation and with their dynamism. Many start-ups and high growth firms (like gazelles and unicorns) usually start as SMES and they experience strong growth with their innovation and comparative advantages in new niche areas. Even though SMEs produce later on many successful and enduring firms, they also face numerous problems like their short duration in the markets and lower productivity. Moreover, they can have problems in terms of accessing to financial resources, obtaining skilled labor force, finding customers, competition pressures, regulation and cost of labor.

Given the importance of SMEs for national economies and the myriad of problems that they face, governments also design policies to help SMES towards easing their problems. For example, governments can facilitate subsidizes borrowing for SMEs to ease their financial constraints, can provide government-sponsored training programs to increase the skill level of labor force, and can provide export credits to increase their competitiveness in international markets. The important role of SMEs in the economies and wide spread implementations of policies targeting these firms display the need for detailed analysis of SMEs in terms of their role in the economy, their economic dynamics, identification of problems they face and proposals on the related policies.

There is a large and growing literature on the financial market imperfections and credit constraints of firms, including SMEs. In contrast to the assumption of perfect capital markets where firms would have continuous excess to deep financial markets without any restrictions or imperfection and the composition of financing would not matter for real decisions (like investment of capital or hiring of labor), the literature presents several theoretical or analytical frameworks like information asymmetries, moral hazard, and adverse selection such that under these cases firms could face significant challenges in accessing to resources in financial markets. Additionally, numerous empirical studies show that a sizable portion of firms in both advanced and developing countries face some sort of credit market constraints and difficulties in access to finance. Moreover, these problems are usually observed more severely in the SMEs. It is possible that such problems evolve over time in response to macroeconomic conditions, firm characteristics, and related policies. Therefore, studying the nature of problems in access to finance for SMEs using new data sources for firms in various countries over different periods of time becomes a valuable research endeavour.

Hypotheses:

Hypothesis #1: Size of a firm affects the access to finance positively.
Hypothesis #2: Age of a firm affects the access to finance positively.
Hypothesis #3: Being an exporter affects the access to finance positively.

Methodology:

Three hypotheses about the association of age, size and export status with the difficulty of access to finance will be examined using quantitative methods. Specifically, some regression models will be employed to test the related hypotheses. In contrast to the empirical studies that use balance sheet data using micro-founded equations like EulerEquation approach, there are not yet any well-established equational forms used with survey data. So, the empirical methodology will follow the relevant papers that use the same survey data of the SAFE.

One crucial point in employing the appropriate technology and regression methods is about the type of dependent and independent variables. The SAFE data is built on firm level data for more than 30 countries. In the firm level data, each firm is asked questions on some properties like whether it is micro, small or medium size, or whether it faces difficulty in access to finance or not. The answers to these questions are some categories like dummy variables with yes or no answers (like a firm is micro sized or not, and it faces difficulty in access to finance or not). Then, if the analysis is conducted at the firm level, it would be appropriate to use regression methods that are suitable to categorical variables like Probit or Logit regressions. Many of the papers that use firm level data (Banerjee, 2014 and Ferrando et al., 2017) employ such methods.

However, as this thesis uses not the firm level data but the publicly available aggregated data at the country level, the nature of variables change. For example, instead of a categorical variable in the form of a firm being micro sized or not in the firm level data, country level data has the share of firms in the sample as the relevant variable. In other words, for the micro size variable, the data set has the percent share of micro sized firms in the whole sample for a given year, with a possible range from 0 percent to 100 percent. This property can be also seen from the summary statistics in Table 2. For example, average share of micro sized firms in the whole sample of 199 observations is 44 percent with a range from minimum of 27 percent to a maximum of 69 percent. Therefore, the variables in country level data are in interval form in contrast to categorical form in the firm level data. As interval variables are a class of continuous variables, then using the standard regression methods like Ordinary Least Squares (OLS) would be appropriate with the given form of survey data.

Expected Contribution:

The objective of this thesis is to examine one specific and important aspect of SMEs, which is the issue of access to finance. This is a crucial topic for SMEs since it is usually found in the literature that these firms face financing constraints or difficulties in access to finance more intensively compared to large firms. Then, understanding fundamental causes of these financing constraints becomes an important research and policy question. For example, if the main reason for difficulty in access to finance is the lack of collateral or guarantees then government can devise policies that support this channel for SMEs like government subsidy on collateral requirements or sharing of collateral risk between firm and government. Similarly, if main financing difficulty arises from high level of interest rates or supply issues in banking sector, then a related policy can be government subsidized lending to SMEs. Therefore, proper identification of problems facing SMEs in terms of access to finance can produce valuable information for both academicians and policymakers.

Outline:

1. Motivation: SMEs have a very important role in a country's economy. They have been facing several challenges, which arise from accessing the necessary financing.
2. Literature Review: I will give brief information about the empirical researches that have been made previously on this topic. I will talk about theoretical and empirical studies on credit market imperfections and access to finance.
3. Data: I will explain how I will collect the related data and how I implement them for my analysis.
4. Methods: I will explain the method that I use, including how I calculate the values, set the model and reach the outcome that I have been searching for.
5. Results: I will discuss the outcomes of the empirical analysis.
6. Concluding remarks: I will rep up my findings and then summarize the implications.

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List of Abbreviations

BDDK	Banking Regulation and Supervision Agency of Turkey
ECB	European Central Bank
EU	European Union
GMM	Generalized method of moments
KGF	Credit Guarantee Fund of Turkey ("Kredi Garanti Fonu")
MOD	Ministry of Development
OLS	Ordinary Least Squares
QNB	Qatar National Bank
SAFE	Survey on the Access to Finance of Enterprises
SME	Small and Medium Enterprises
UK	United Kingdom

1 Introduction

The Small and Medium Sized Enterprises (SMEs) are the backbones of economies with their high share of employment generation and with their dynamism. Many start-ups and high growth firms (like gazelles and unicorns) usually start as SMES and they experience strong growth with their innovation and comparative advantages in new niche areas. Even though SMEs produce later on many successful and enduring firms, they also face numerous problems like their short duration in the markets and lower productivity. Moreover, they can have problems in terms of accessing to financial resources, obtaining skilled labor force, finding customers, competition pressures, regulation and cost of labor.

Given the importance of SMEs for national economies and the myriad of problems that they face, governments also design policies to help SMEs towards easing their problems. For example, governments can facilitate subsidizes borrowing for SMEs to ease their financial constraints, can provide government-sponsored training programs to increase the skill level of labor force, and can provide export credits to increase their competitiveness in international markets. Such issues and policies are also prevalent in many European countries, as well as in developing economies. The important role of SMEs in the economies and the wide spread implementations of policies targeting these firms display the need for detailed analysis of SMEs in terms of their role in the economy, their economic dynamics, identification of problems they face and proposals on the related policies.

There is a large and growing literature on the financial market imperfections and credit constraints of firms, including SMEs. In contrast to the assumption of perfect capital markets where firms would have continuous excess to deep financial markets without any restrictions or imperfection and the composition of financing would not matter for real decisions (like investment of capital or hiring of labor), the literature presents several theoretical or analytical

frameworks like information asymmetries, moral hazard, and adverse selection such that under these cases firms could face significant challenges in accessing to resources in financial markets. Additionally, numerous empirical studies show that a sizable portion of firms in both advanced and developing countries face some sort of credit market constraints and difficulties in access to finance. Moreover, these problems are usually observed more severely in the SMEs. It is possible that such problems evolve over time in response to macroeconomic conditions, firm characteristics, and related policies. Therefore, studying the nature of problems in access to finance for SMEs using new data sources for firms in various countries over different periods of time becomes a valuable research endeavor.

The objective of this thesis is to examine one specific and important aspect of SMEs, which is the issue of access to finance. This is a crucial topic for SMEs since it is usually found in the literature that these firms face financing constraints or difficulties in access to finance more intensively compared to large firms. Then, understanding fundamental causes of these financing constraints becomes an important research and policy question. For example, if the main reason for difficulty in access to finance is the lack of collateral or guarantees then government can devise policies that support this channel for SMEs like government subsidy on collateral requirements or sharing of collateral risk between firm and government[1].Similarly, if main financing difficulty arises from the high level of interest rates or the supply issues in banking sector, then a related policy can be government-subsidized

[1] Such a policy called "Credit Guarantee Fund" was implemented in Turkey in 2017. See Ant and Kozok (2017). The policy was intended to increase the availability of credit to SMEs though Treasury taking the risk and cost of collateral requirements. The policy did not have any restrictions on interest rates.

lending to SMEs[2]. Therefore, proper identification of problems facing SMEs in terms of access to finance can produce valuable information for both academicians and policy makers.

This thesis will use a current data set of SMEs' access to finance in European countries. The dataset called the Survey on the Access to Finance of Enterprises (SAFE) is conducted jointly by the European Commission and the European Central Bank. This survey collects detailed information on the characteristics of firms and their access to finance in around 34 European countries. Public data is available at the country level since 2011 which provides a large enough sample size to conduct related analysis. The main focus of the thesis will be the relationship of some firm characteristics like size, age and exporter status with the difficulty of accessing to financial resources. So specifically, the thesis will test the hypotheses of whether aforementioned firm characteristics are associated with access to finance. Further analysis will be also conducted on the possible causes of financing difficulties like the lack of collateral or guarantees.

Moreover, as the data set contains a diverse set of countries with different characteristics some robustness analysis will be conducted on the effects of cross-country differences on the association between firm properties and access to finance. It might be the case that countries with deeper financial markets can provide more financing options to the SMEs than the countries with shallower financial markets. So financial deepening in a country can be an important mediating factor for the association between firm characteristics and access to finance. Similarly, firms in the countries that were affected by the sovereign debt problems in 2011 and 2012 (mainly southern European countries like Greece, Spain, Portugal and Cyprus) can experience higher level of difficulties in access to finance since

[2] Such a policy called "Funding for Lending" was implemented by the Bank of England in the UK in 20102. The policy aimed to expand the supply of credit at reasonable interest rates to SMEs in a time of restricted banking credits. See Havrylchyk (2016).

their financial markets and credit supply might be still recovering from the related crises. So, the state of credit markets measured by the experience of sovereign debt crises can be also another important factor regarding the effects of firm characteristics on access to finance. Moreover, countries can be grouped according to some macroeconomic performance measures like growth rates, inflation levels or current account positions (showing the saving-investment imbalances in the country or the need of financing at the aggregate level), and then whether these factors would matter for the access to finance can be checked, producing valuable information on the financing problems.

This research is expected to contribute to the relevant literature and policy circles on several dimensions. First, it provides a very up to date and dynamic analysis for access to finance issues in European countries with data starting from 2011 and including the very recent period of 2017. So, the thesis will provide a broad and recent picture of the issue. Secondly, the use of survey data SAFE has some advantages over the studies that employ balance sheet data. While studies that use balance sheets or income statements provide valuable findings on the topic, they usually employ some techniques (like cash flow regressions as explained in the literature review section) to identify whether firms are financially constrained or have difficulty in accessing to financial resources. However, these techniques are susceptible to measurement or estimation errors which could lead to inaccurate findings about access to finance issues. Moreover, there are also debates in the literature on the proper methods of measurement and estimation of credit market constraints. In contrast to such problems, the use of SAFE survey data provides a direct measure of the access to finance by directly asking firms whether they face any problems in this dimension. Moreover, the survey also collects information on the possible reasons of difficulties in access to finance like the lack of collateral or guarantees. So, the thesis contributes to the relevant literature by using a more robust measure of access to finance and examine possible reasons for it using data

directly obtained from the firms and not derived indirectly using other data. Thirdly, the thesis provides a rich framework for the effects of cross-country differences. One can try to infer about these effects using various studies conducted on different countries. However, as these studies usually employ different methods, sampling selections, time periods and so on, the cross-country comparison could contain some weaknesses. In contrast, the SAFE data set collects the same information over the same period for the similarly chosen SMEs in different countries. So, this nature of the data set makes the cross-country comparisons more robust and informative.

In addition to the result-oriented contributions above, this paper has also methodological contributions. The regression analyses employ fixed effects and dynamic GMM techniques to examine the financing constraint issue using country level data. In contrast, all papers (like Ferrando and Griesshaber, 2011, Ferrando et al., 2017, Ozturk and Mrkaic, 2014, Banerjee, 2014 and Gomes, 2018) that use SAFE database to study financial constraints employ logit or probit models as they have firm level data. Relative to these methods, the use of fixed effects and dynamic GMM techniques in this paper presents some advantages like controlling for omitted country-specific fixed effects, accounting for dynamic structure in the access to finance problem and using instrumental variables to deal with endogeneity issues. Therefore, this paper also makes important methodological contribution by employing these methods for the first time with SAFE country-level dataset for access to finance problem of SMEs.

The thesis will have a structure as the following. Chapter 2 reviews the role of SMEs in the European countries, while Chapter 3 provides the literature review of theoretical and empirical studies on credit market imperfections and access to credit as general and as for SMEs. Then Chapter 4 gives the hypotheses which are going to be tested, Chapter 5 describes the data which will be utilized, Chapter 6 presents the methodological approach that will be

performed and Chapter 7 gives the econometric analysis. Results and remarks are presented in Chapter 8, suggestions to ease the access to finance problem of SMEs are given in Chapter 9, limitations of the data and the thesis as a whole are presented in Chapter 10, and lastly Chapter 11 concludes the thesis.

2 The Role of SMEs in Europe

The important role of SMEs in many countries, including Europe, is documented widely in the literature and in policy reports. For example, European Commission (2017) estimates that in terms of number of enterprises, 99.81 percent of total number of enterprises are SMEs in Europe in 2016. This report assumes that SMEs are comprised of micro, small and medium-sized companies. Micro firms are firms with less than 10 employees and with less than 2 million euros in turnover, and small firms are firms with between 10 and 50 employees and with between 2 and 10 million euros in turnover, while large firms are firms with between 50 and 250 employees and with between 10 and 50 million euros in turnover. Table 1 gives the share of SMEs in the EU-28 non-financial business sector in terms of number of enterprises, number of employees and total value added.

Table 1: The Share of SMEs in EU-28 Non-financial Business Sector for 2016

	Micro	Small	Medium	SME	Large	Total
			Number of Enterprises			
In thousands	22,232	1,392	225	23,849	45	23.894
% of Total Enterprises	93.0	5.8	0.9	99.8	0.2	100.0
			Number of Employees			
In thousands	41,669	27,982	23,398	93,049	46,665	139,714
% of Total Employment	29.8	20.0	16.7	66.6	33.4	100.0
			Value Added			
In trillion Euros	1,482	1,260	1,288	4,030	3,065	7,095
% of Total Value Added	20.9	17.8	18.2	56.8	43.2	100.0

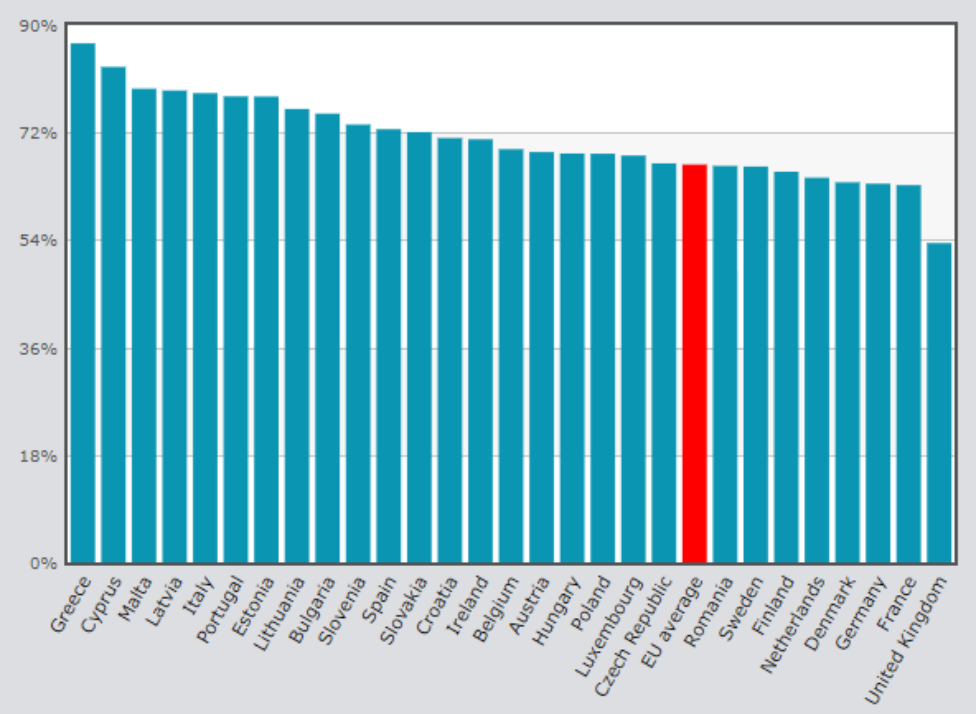
Source: European Commission (2017) (Table 2, p.12).

As seen in the table, 99.8 percent of enterprises are SMEs in terms of total number of enterprises, while SME share in term of total employment is 66.6 percent and SME share in terms of value added is 56.8 percent as of 2016. European Commission (2017) documents that

SMEs are especially important for the sectors of 'accommodation and food services', 'business services' and 'construction' with more than 80 percent employment share (p.6) and SMEs are big driver of growth in European countries.

There are some variations in the share of SMEs across the countries as presented by Figure 1. As shown in the figure, the SME share of employment in individual countries range from the low value of 53.48 percent in the UK to 86.93 percent in Greece with a Euro-wide average of 66.63 percent. The figure also display that expect the UK, all countries have SME employments share of higher than at least 63 percent.

Figure 1: The Share of SME Employment in EU-28 Non-financial Business Sector



Source: European Commission (2017).

Given the high weight of SMEs in the European economy, these firms also matter for different dimensions of economic developments. For example, Cernat et al. (2014) argue that SMEs have important role in the exports of European countries. The authors find that around

80 percent of exporter firms are SMEs and these firms account around 33 percent of total exports. However, they also find that this performance varies greatly across European countries and effective trade policies would be needed in some countries to increase the export performance of SMEs. European Commission (2011) also examines the international business practices of SMEs in Europe and finds that round 30 percent of SMEs have some international economic activity abroad. These exporting SMEs report that they face some barriers to international economic activities in terms of risk of getting payment, bureaucratic hurdles and difficulty of adequate financing. So, access to financing can be an important issue even for exporting firms. The report notes that government support to SME exporters increases the economic performance of these firms (European Commission, 2011).

Abel-Koch et al. (2015) examine the investment and innovation behavior of European SMEs. The authors emphasize that given the comparative advantage of firms in developing countries in terms of lower costs, it is imperative for European firms to focus on reputation, innovation and quality. Using data for France, Germany, Italy and Spain, they find that SMEs with higher investment rates and more active innovation activities have better economic performance and higher international competitiveness indicators. Additionally, the authors note that financing difficulties form important obstacles to both investment and innovation activities and propose implementing related policies (Abel-Koch et al., 2015). Similar proposal for economic policies targeting SMEs in Europe are suggested by some papers like Floyd and McManus (2005) as well.

Regarding the employment performance of SMEs, de Kok et al. (2011) study the quantity and quality of jobs created by the SMEs in Europe. The authors state that between 2002 and 2008, 85 percent of net jobs created in European countries originated from SMEs. Given that employment share of SMEs is around 65-70 percent as shown above, this larger than proportionate increase in employment growth implies that SMEs create more jobs than

large firms. Most of this positive growth effect comes from the creation/entering of new firms as SMEs. However, the authors also note that the quality of jobs created by SMEs in terms of salaries, flexibility, security, training, on-the-job learning and skill accumulation is not as high as in the case of large firms and propose related economic policies in these dimensions.

Another area that attracted great attention in academic, policy and business circles related to SMEs is the credit constraints that these firms face. For example, Bremus (2015) notes that majority of SMEs depend on loans from banking sector and this channel was hampered significantly during the financial crises of 2008-2009 and European sovereign debt crises of 2011-2012. Using the SAFE database, Artola and Genre (2011) find that small and young firms face higher credit constraints during the crises while Ferrando and Griesshaber (2011) show that ownership also matters in access to finance. Then, Bergthaler et al. (2015) suggest that related credit and financing policies aimed at financially constrained SMEs become important economic policy areas.

A specific area related to credit constraints of firms is its growth effects. As, SMEs form the basis of economic growth and employment creation, the conditions under which credit constraints restrict the growth of these firms attracted significant research and policy interest. For example, Beck and Demirguc-Kunt (2006) note that small firms face higher growth restrictions and experience significant problems to access to finance both in developed and developing countries. The authors find that institutional progress and financial development eases these constraints of small firms. Additionally, specific financing instruments in terms of financing and leasing also improves the access to finance and other arrangements like mechanisms for sharing credit score/information facilitate this process (Beck and Demirguc-Kunt, 2006).

Regarding the growth effects, Campello et al. (2010) use data for large corporations with a sample size of 1050, including firms from the European Union as well. They

specifically examine the behavior of the firms around the global financial crisis. The authors show that credit constrained firms were affected more negatively from the crisis. These firms decreased investment expenditure and technology-related outlays much more than unconstrained firms. Additionally, they cut their work force as well as dividend payments again more than the other firms (Campello et al., 2010). These differences imply that constrained firms were not able to smooth the negative effects of global financial crisis using financial markets. Normally, economic theory suggests that firms would use credit facilities to smooth such adverse events. However, as constrained firms face significant problems in access to finance, this restriction leads them to feel the impact of negative events more sharply, with important growth consequences.

There are some further papers looking at the growth effects of financial constraints. For example, Ferrando and Mulier (2015b) examine the case of firms in 9 European countries in the following four years of global financial crisis, using the SAFE database. The authors have a specific way to determine the financial constraint of firms. They specifically examine the ones that do not apply to financial institutions for a loan because of the fear of rejection. These firms would be possibly facing very extreme financial constraints and using their data can allow better identification of the financial constraint effects. Ferrando and Mulier (2015b) find that discoursed workers face significant negative effects on investment, employment and asset growth. Additionally, the authors show that higher interest rates also lead to higher discouragement (Ferrando and Mulier, 2015b). This finding might imply that financially constrained firms would be more negatively affected by the tightening of monetary policies. Similarly, Coluzzi et. al. (2015) also look at the effects of financial constraints on growth for five European countries, namely Spain, Portugal, Italy, Germany and France. The authors use both balance sheet and survey data and find that financial constraints affect firm growth negatively.

Overall, the SMEs have very significant share in European economies in terms of number of enterprises, total number of employment and total value added. In other words, numerous studies show that SMEs are responsible for a larger share of net employment creation, around a third of them participate in international business activities, and more innovative ones are also the more profitable and competitive firms. SMEs are commonly shown to be affected from financial constraints in terms of growth. Namely, constrained firms have lower output and employment growth as generally stated in the existing literature. Given the important role of SMEs in the economies, most of the related studies -as well as this thesis, which is thought to be a valuable addition to those existing ones- point out the need for properly designed policies, including financial policies aimed at easing credit constraints and access to finance.

3 Literature Review

The topic of financing constraints faced by firms is one of the most widely studied (both theoretically and empirically) topics in economics and finance literatures. The theoretical models usually start with the assumption of perfect capital markets as posited in Modigliani and Miller (1958). This benchmark model (which is also called the neoclassical theory of investment or the irrelevance theorem) implies that when firms have access to perfect capital markets, their financial situation like the amount of internal funds, the use of equity or bank financing would not matter for the real decisions of firms. For example, if a firm gets new investment opportunities with profitable outcomes, then this firm can finance the investment need (like getting new machines or hiring additional workers) easily within the financial markets, and the financial situation of the firm (such as the leverage, amount of internal funds or collateral etc.) would not be effective in this decision. So, for accessing to the related financing amount would only depend on the investment opportunity and the financial conditions of the firm itself would be irrelevant for this decision.

The assumptions of perfect capital markets and the irrelevance of own financial conditions are usually seen as being too strong or restrictive. Some theoretical models relax these assumptions and study the properties of firm financing under imperfect capital markets (Jensen and Meckling, 1976; Stiglitz and Weiss, 1985; and Myers and Majluf, 1984). These papers study the different cases of capital market imperfections like asymmetric information, moral hazard and adverse selection and show that the existence of these imperfections leads to a premium on external finance and more importantly the financial situation of the firm such as the amount of internal funds would matter significantly for their access to financial markets. So, firms can face serious financial constraints which would limit their ability to exploit profitable investment opportunities. In other words, even if some profitable investment

opportunities existed, the firms would need access to the relevant funds from the financial markets and the own financial situation of the firm would be important in this ability to access to the financial markets.

A large empirical literature has followed these theoretical models on financial imperfections and credit constraints. As Bremus (2015) notes, the related empirical papers mainly use two sources of data set. On strand uses hard data on firms like balance sheets and income statements. Other strand uses survey data which asks direct questions on credit constraints of firms. Initially, literature was dominated by balance sheet data but with the increasing availability of firm level surveys over some period of years, survey data started being using extensively as well. In terms of the balance sheet data, the seminal paper of Fazzari et al. (1988) tested the credit constraints by using Tobin's Q approach. This approach tries to approximate the profitable investment opportunities with Tobin's Q, which is a market based and forward looking variable. Then, the sensitivity of investments decisions, after controlling the effect of Tobin's Q, to the internal funds is checked. Under perfect capital markets, this sensitivity would be zero as the financial position of the firm would not affect the real investment decision. However, if markets are not perfect and firms face some constraints in accessing to finance, this approach expects some positive sensitivity of investment to internal funds or cash flows of the firm. This approach (which is also called the cash flows sensitivity approach) has led to a very large literature testing the credit constraints and many of them finding positive results[3].However, some papers like Kaplan and Zingales (1997) and Cleary (1999) brought some theoretical and empirical criticism to Tobin's Q approach stating that this framework might not be capturing the credit constraints properly and might be leading to wrong results and conclusions indeed.

[3]See Hubbard (1998) and Bond and van Reenen (2008) for some literature review.

Criticism of Tobin's Q approach along with its restrictive use only for stock market firms for which this variable can be estimated (i.e. Tobin's Q is not available as a variable for non-public firms) have led to a different method called the Euler equation approach (Whited, 1992, and Bond and Meghir, 1994). This approach is based on the optimization problem of a firm in a micro framework and each variable in the estimation equation has specific meaning. Positive coefficients on lagged internal funds or cash flows (not the contemporaneous ones as in Tobin's Q) indicate to credit constraints for the related firms. This approach has also led to a large empirical literature with many papers finding credit constraints for firms in both advanced and developing countries. This literature usually finds that small and young firms face credit constraints more intensively than large and mature firms. This finding is generally associated with the higher level of information problems for these firms. As they are young and small, these firms might have limited relationships with the financial agents, and they might have limited reputation or trust-building due to their short term in the economic activity. Then these factors can lead to higher level of information asymmetries and related problems making these firms more financially constrained than others.

Another factor that can lead to credit constraints and risk premia on financial borrowing is the existence of agency problems within the firms. Jensen and Meckling (1976) study a firm structure where ownership and management are separated. As firms have gotten larger and more complex over time with their growth in scale and scope in the process of globalization, the management tasks have become more complex for owners as well. This process has led to the separation of ownership and management, with the management tasks being delegated to the professional executives. However, Jensen and Meckling (1976) show that this separation of ownership and management has created its own problems. These problems are usually called the "principal-agent" problems. The owners are the "principal" who hires professionals (who are called "agent") to conduct the management tasks. In this

agreement, the professionals are supposed to work for the benefit of owners. However, the difficulty of perfectly observing the ability of professional managers and the high costs of monitoring their every activity create some possibilities that agents might not be actually behaving in the interest of the owners or shareholders. There are many studies trying to devise policies or contracts such that this problem would be lessened. However, there are no easy solutions to this problem and many negative implications (like short-termism of corporate decisions or too much risk taking) still continue to materialize in the business and economic lives. In such settings, it is possible that agents can prefer to use more than necessary financial loans to support the unproductive or unprofitable growth of the company. Such a move would be harmful for owners and shareholders while it would be beneficial for managers and executives. Then, knowing that serious agency problems can exist within corporations, financial institutions would take into account such factors in lending decisions. Such a case can lead to some premium on the lending interest rates or can cause some rationing of the available credit. Both of these are some forms of financial constraints and they would imply some problems with access to finance.

As the availability of survey data has increased, the number of studies examining the issue of access to finance has also increased. Even though these studies provide a more direct measure of access to finance (namely, firms are asked directly whether they face financing constraints and how important this problem for them is on a quantitative scale), there is possibility of perceptions being different than reality and different firms can perceive the same situation at different intensities (Ferrando and Mulier, 2015a). Additionally to this problem, there are also not any well-established or micro-founded methods to use these data as in the case of Euler equation approach. So it is accepted that survey data has both its advantages and disadvantages compared to balance sheet data while performing empirical analysis.

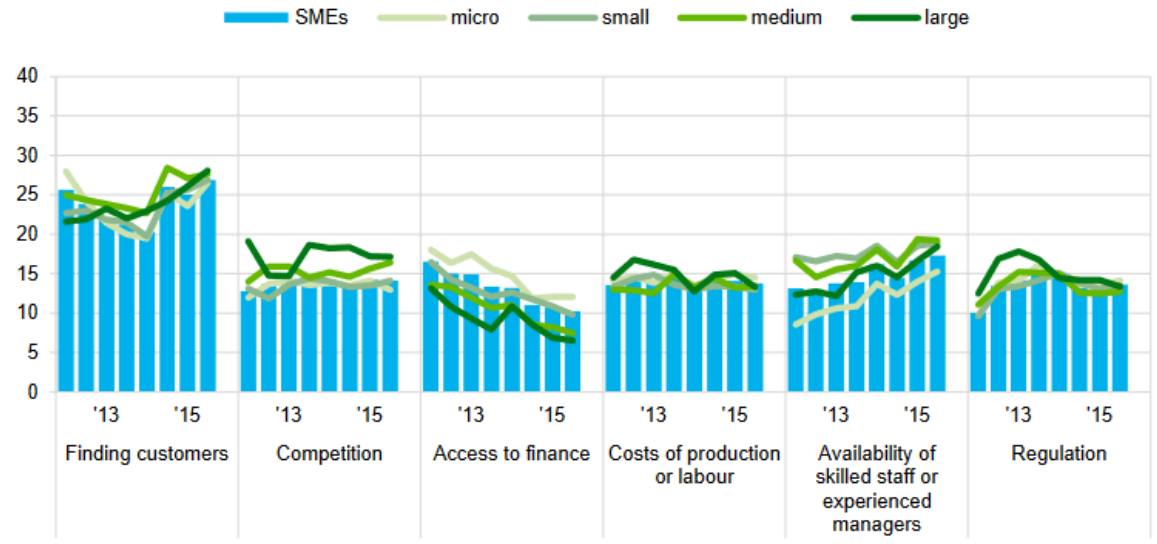
Regarding the SAFE data set and the issue of access to finance there are also some recent studies. For example, Ferrando and Griesshaber's (2011) work is one of the first studies using the SAFE data set to examine credit constraints for SMEs in Europe. The authors use probit regression and multinomial logit regression analysis as they have the firm level data. Their dependent variable is the answer that the most pressing problem facing the firm is the access to finance. After detailed analysis, they find that young SMEs face higher level of credit constraints while the effect of size is indeterminate. Regarding the impact of size on other factors, the authors note that "firm size becomes important to explain the choice of different sources of finance with larger firms having a preference (or the possibility) to draw more on external funds, which itself appears strongly related to the experience of financing obstacles" (Ferrando and Griesshaber, 2011,p.18).

A very recent analysis by Ferrando et al. (2017) find that small firms face higher credit constraints. The authors use SAFE dataset to examine the impact of both sovereign debt crisis in some European countries (namely, Greece, Ireland, Italy, Portugal, and Spain) and the accommodative monetary policies of the European Central Bank (ECB) on the financial constraints of the firms. They postulate that sovereign debt crisis would worsen the access to finance for firms while accommodative monetary policies would lessen these problems. The authors use logit or probit models along with macroeconomic control variables at the country level and find supportive evidence for both claims. Moreover, they note that small firms face higher problems in terms of access to finance.

In another study, Ozturk and Mrkaic (2014) study the factors that affect the SMEs' access to finance in Europe using the same SAFE data set. The authors use ordered logit model to examine whether risks in the banking sector or the balance sheets of firms would lead to higher problems related in access to finance for SMEs. To measure the risk in the banking sector, the authors use CDS premiums in each country, while they use the change in

debt-to-asset ratios as a proxy for balance sheet problems. Then, they find that "an increase in bank funding costs is negatively associated with firms' access to finance, though only in stressed economies" and "that those firms that reported an increase in their debt to assets ratios are significantly more likely to report deterioration in their access to finance, regardless of firm size, the sector, and of whether they are located in the stressed economies or the rest" (Ozturk and Mrkaic, 2014, p.4). So, the authors get supportive evidence for their hypotheses. Moreover, they find that both size and age are positively related to the access to finance, in other words larger and mature firms face less credit constraints. In another paper, Banerjee (2014) also studies similar questions using the same firm-level data set and finds that young firms are more financially constrained than the older ones.

Figure 2: Most Pressing Problems Faced by Euro Area SMEs (% of respondents)



Source: ECB (2016).

To illustrate the relevance of access to finance problems for SMEs, Figure 2 below shows the most pressing problems faced by Euro Area SMEs, obtained from the SAFE database (ECB, 2016). Figure illustrates that access to finance is the most pressing problem for around 15 percent of SMEs and it is the third most common problem after finding

customers and competition. Moreover, the intensity of access to finance problems varies with the size of the firms. This problem is most acute for micro firms and eases as the firm size moves to from small to medium and to large firms.

Another very recent paper using the same SAFE database is Gomes (2018). The author conducts analysis on around five thousand firms from 12 European countries for the period of 2014-2016. Various measures of credit constraints are developed like loan application being rejected, quantity rationing in terms of getting partial loan, price rationing in terms of too high interest rates, and discouragement (not applying for fear of rejection). The author finds that financially constrained firms have 5.5 percentage points higher probability in terms of decreasing investment expenditures, and 2.9 percentage points higher probability in cutting workforce. Additionally, these negative effects of financial constraints are found to be related to firm characteristics like age and size (Gomes, 2018). Namely, smaller and younger firms are more financially constrained than larger and older firms. Gomes (2018) also notes that these large effects are just the intensive margin impact of access to credit issues, i.e. problems for the existing firms. There would be also some extensive margin effects due to the deferred entry of potential new firms because of financial constraints and the higher exit rates of existing firms again because of difficulty of obtaining loans to stay in the business. So, the total economic and growth effects of financing constraints can be much larger for the new firms which face entry barriers and high exit rates in the market.

4 Hypotheses

Given the above review of related literature in this particular area, it is seen that there are strong theoretical arguments (like higher level of information asymmetries for young and small firms) and extensive empirical findings that young and small firms face severe financial constraints, with significant economic effects. Based on these findings, this thesis will test the following two hypotheses regarding the effects of age and size on the access to finance. Main purpose of testing these two hypotheses is trying to see whether the results will be the same or different from the previous findings of Ozturk and Mrkaic (2014), Banerjee (2014) and Ferrando et al. (2017) or not, who have employed different methods to test and confirm both age and size are robust predictors of access to finance problem of SMEs.

H1: Size of a firm affects the access to finance positively.

H2: Age of a firm affects the access to finance positively.

Another point of the interest in this thesis is the effect of exporter status on the access to finance. This is less studied in contrast to the effects of age and size in the literature. There are numerous existing studies on whether financing constraints affect the firm`s export entry decision or performance of firms (see Manova, 2013). However, the relationship in other way around, namely the effect of being an exporter on the access to finance, is studied less in the literature. One can propose that by showing the ability of exporting, a firm can provide positive signals on its organizational and productive capacity, thereby enhancing also its reputation. In such a case, being an exporter can be expected to ease the access to finance by providing trustworthiness. One paper, which examines this relationship is written by Manole and Spatareanu (2009) and finds that exporter firms are less financially constrained than the non-exporter ones. However, authors argue that this might be coming from the selection of less constrained firms into exporting. In other words, sampling error might have occurred

during the observation of sampling rather than sampling a bigger portion of the population. In the light of the given conceptual and empirical evaluations, the third and the last hypothesis in this thesis which is going to be tested is the possible effect of being an exporter firm on the access to finance.

H3: Being an exporter affects the access to finance positively.

Overall, there are large theoretical and empirical literatures on the financing constraints of SMEs, the economical and growth (like output, employment and investment) effects of these constraints and policies aimed at easing these constraints. This thesis will test three specific hypotheses on the effects of size, age and exporter status on the access finance for SMEs in the European Union, to be able to illustrate a clear picture to the policymakers about the access to finance problem of SMES – the backbones of the economies. The thesis also aims to contribute to this literature by disentangling the effects of country characteristics like sovereign debt problems and macroeconomic performance.

5 Data

The data set used in this thesis is the Survey on the Access to Finance of Enterprises (SAFE) which is conducted jointly by the European Commission and the European Central Bank. This survey is conducted every 6 months since 2009 for Euro countries. The European Commission conducts the same survey on an annual basis for a larger set of countries. On the survey webpage of the European Commission country level data is available to public for the years of 2011, 2013, 2014, 2015, 2016 and 2017. The structure of questions was changed slightly starting from the survey in 2015, but the access to finance questions is the same in all surveys. There are around 34 European countries in the 2017 survey (namely EU28 plus Iceland, Turkey, Montenegro, Albania, Macedonia and Serbia)[4]. The data set has very detailed questions on the financing conditions of SMEs in Europe along with detailed firm characteristics. Table 2 below gives the summary statistics of some basic variables that will be used in the empirical analysis in the following sections.

There are 6 years in the sample with around 33 countries in each year, so the total number of observations is 199 for most variables. However, questions on exports and credit history were not asked in 2011 and 2013, so the total number of observations fall to 131 for these questions. The first variable of interest is the difficulty in access to finance. Firms are given several problems/difficulties (like finding customers, regulation, costs of labor etc. and asked to choose the relevant ones). For the whole sample, average share of firms stating that they have difficulties in access to finance are 13 percent, with a range of 5 percent to 45 percent. One can expect that this problem becomes more acute during the years of crises when

[4]Full list of countries is as follows: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, UK, Iceland, Turkey, Montenegro, Albania, Macedonia and Serbia.

the supply of credit declines. Another question is about the difficulty of finding collateral. 19 percent of firms acknowledge this problem with a wide range from 1 percent to 64 percent.

Table 2: Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
Difficulty in Access to Finance	199	13%	7%	5%	45%
Difficulty of Finding Collateral	197	19%	10%	1%	64%
High Employment Growth	199	14%	7%	1%	44%
High Sales Growth	199	17%	8%	2%	52%
Credit History Improved	131	24%	8%	9%	43%
# of Employees < 10	199	44%	9%	27%	69%
# of Employees between 10 and 50	199	30%	5%	16%	38%
# of Employees between 50 and 250	199	27%	5%	12%	39%
Age <2 year	189	13%	26%	0%	84%
2 years < Age < 5 years	199	8%	6%	0%	29%
5 years < Age < 10 years	199	15%	6%	2%	35%
Age > 10 years	199	63%	28%	0%	92%
No Exports	131	51%	9%	30%	70%
0 < Exports < 25	131	23%	5%	9%	34%
25 < Exports < 50	131	9%	3%	2%	21%
Exports > 50	131	15%	6%	6%	41%

The shares of firms with high employment or sales growths are included in the table to see whether in such high growth cases, firms can get the financing they need. High growth is defined as more than 20 percent average annual growth in last three years. The shares of these firms are at 14 percent and 17 percent for employment and sales, respectively. Next variable of interest is the credit history of the firm. In the last three years, firms are asked whether their credit history has improved, unchanged or deteriorated in the last half year. The share of answers with the credit history improvement is chosen to be included in the analysis in order to see how credit history affects the access to finance.

The next set of variables in Table 2 is the main independent variables of this thesis, which are the size, age and exporter indicators. For the size, the number of employees is used as the main criteria in line with the standard implementation in the literature. So, if the

number of employees is less than 10, the firms are classified as “micro”, if employee size is between 10 and 50, the firm is “small” and if employee size is between 50 and 250, firm is “medium”. Since the data set only contains information on SMEs, there are no firms with more than 250 as the employee size. Table shows that micro size has the highest share with an average of 44 percent, while small is 30 percent and medium is 27 percent. In addition to the number of employees as the size criteria, the variables of sales/turnover will be also used in the robustness analysis. Age is presented in four intervals of less than 2 years, between 2 and 5 years, between 5 and 10 years and more than 10 years. The majority of firms in the sample are over 10 years old with a share of 63 percent. Finally, the exporting situation of the firm is recorded as not exporting (51 percent, exporting between 0 and 25 percent of its turnover (23 percent), exporting between 25 and 50 percent of its turnover (9 percent) and exporting more than 75 percent of its turnover (15 percent). So, around half of the firms in the sample are exporters at differing intensities.

Table 3: Cross Correlations

		1	2	3	4	5	6	7	8	9	10	11	12
1	Difficulty in Access to Finance	1.00											
2	# of Employees < 10	0.28	1.00										
3	# of Employees between 10 and 50	-0.19	-0.92	1.00									
4	# of Employees between 50 and 250	-0.32	-0.93	0.70	1.00								
5	Age <2 year	0.33	-0.04	0.07	0.02	1.00							
6	2 years < Age < 5 years	0.26	-0.10	0.10	0.09	0.79	1.00						
7	5 years < Age < 10 years	-0.10	0.01	-0.06	0.04	-0.46	-0.23	1.00					
8	Age > 10 years	-0.33	0.06	-0.07	-0.04	-0.98	-0.86	0.29	1.00				
9	No Exports	-0.05	0.16	-0.09	-0.19	-0.14	0.01	0.07	0.11	1.00			
10	0 < Exports < 25	-0.03	0.01	-0.03	0.01	0.11	-0.02	-0.20	-0.06	-0.56	1.00		
11	25 < Exports < 50	0.06	-0.07	0.05	0.09	0.01	-0.10	-0.01	0.00	-0.50	0.00	1.00	
12	Exports > 50	0.06	-0.18	0.11	0.21	0.03	-0.01	0.06	-0.04	-0.76	0.05	0.28	1.00

Table 3 presents the cross correlations of main variables to get an initial idea of the possible association between the variables of interest. Regarding the difficulty of financing, table shows that the share of micro firms has positive correlation while the shares of small and large firms are negatively correlated. Moreover, the magnitudes of correlation coefficients also make sense in terms of smaller firms experiencing more difficulty in the access to finance. Age structure also presents a very similar and neat scheme of correlation coefficients. Younger firms experience more difficulties in the access to finance (i.e. higher correlation coefficients) while older firms experience difficulties to a lesser extent (i.e. lower correlation coefficients). Again, the magnitudes of correlations coefficients are ordered in the same fashion with age intervals. These two correlations structures of age and size with the difficulty in access to finance indicate that there is some initial evidence on Hypotheses 1 and 2. To see these patterns of difficulty in access to finance in terms of age and size, Figure 3 and 4 present the related cross-correlation coefficients. As seen from the figure there is a clear pattern, where with size and age, the correlation coefficients with the difficulty in access to finance decline significantly.

Figure 3: Correlation Coefficients of Difficulty in Access to Finance with Age

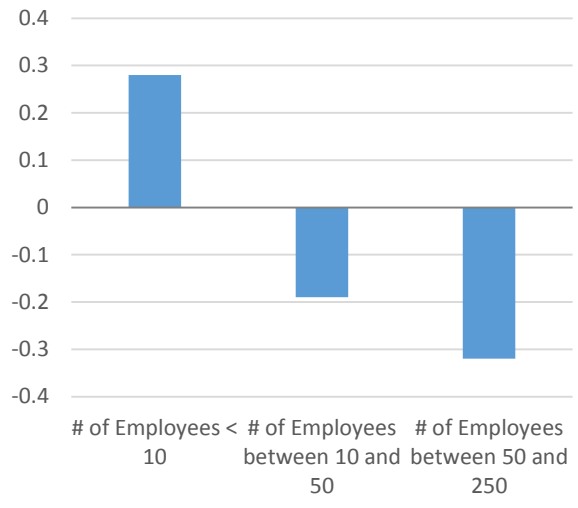
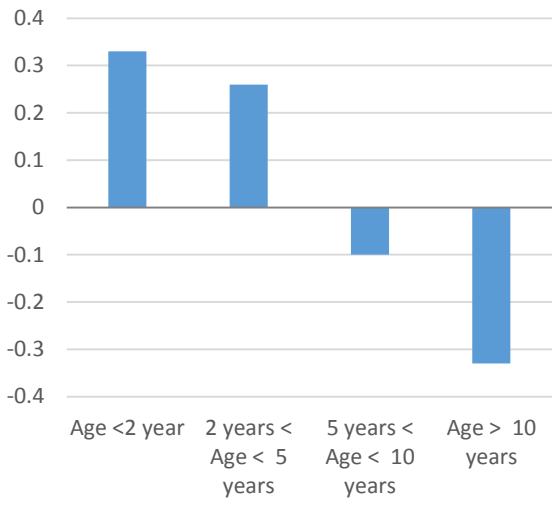


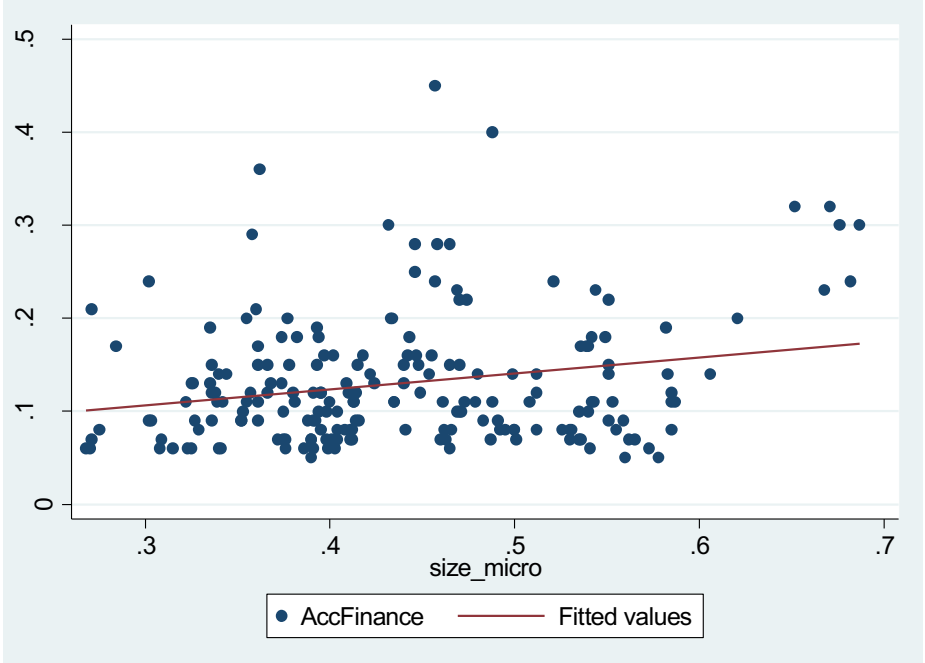
Figure 4: Correlation Coefficients of Difficulty in Access to Finance with Size



Regarding the correlation coefficient of exporting status with the difficulty in access to finance, the relationship seems to be in the reverse order. In other words, firms not exporting at all or exporting between 0 and 25 percent of their turnover seem to have less difficulty in accessing to financial resources while firms with higher share of exporting are found to have more difficulty in access to finance. However, one examined closely, it is seen that the magnitudes of coefficients are very close to zero, so some further technical analysis (like regressions) would be helpful to undercover the fundamental relationship.

So, overall, cross correlations produce some indicative evidence that age and size positively affect the access to finance as put forward in Hypotheses 1 and 2 while they do not indicate any significant relationship between exporting and difficulty in the access to finance for the sample of firms used in the data set.

Figure 5: Relationship Between Problems in Access to Finance and Firm Size

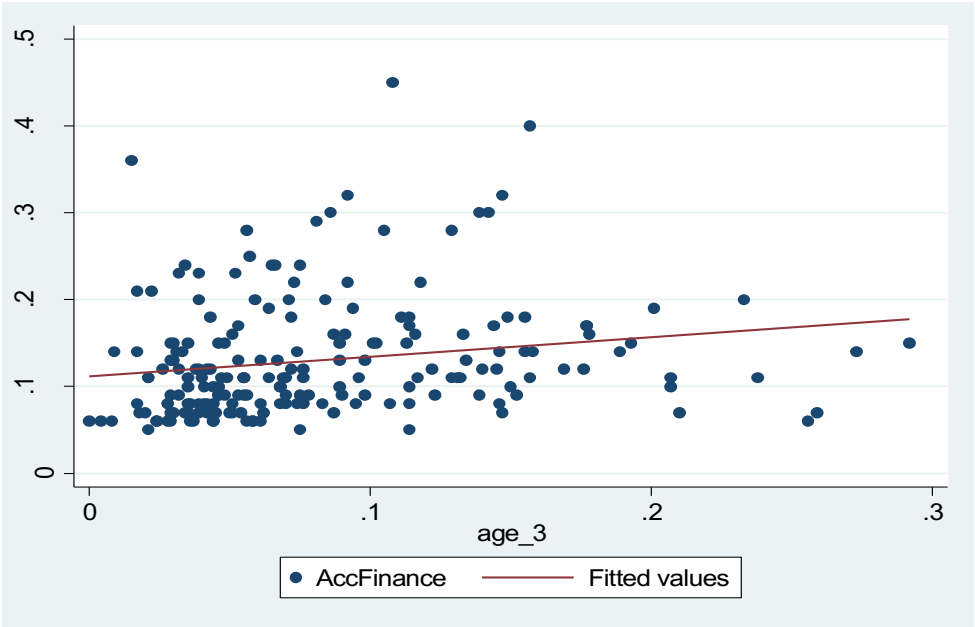


The findings of cross correlations in Table 3 can be graphically checked also using scatter plots of related variables. Figure 5 shows this for the variable of the difficulty in access

to finance and the share of micro firms in the sample. Dots represent the pairs of observations while the strait line is the simple OLS regression fit line of two variables. As seen in the graph and shown by the clear positive slope of the regression fit, there is a positive relationship between two variables. This implies that as the share of micro firms in the sample increases, the incidence of firms experiencing difficulty in accessing to finance also increases. This finding is again consistent with Hypothesis 1.

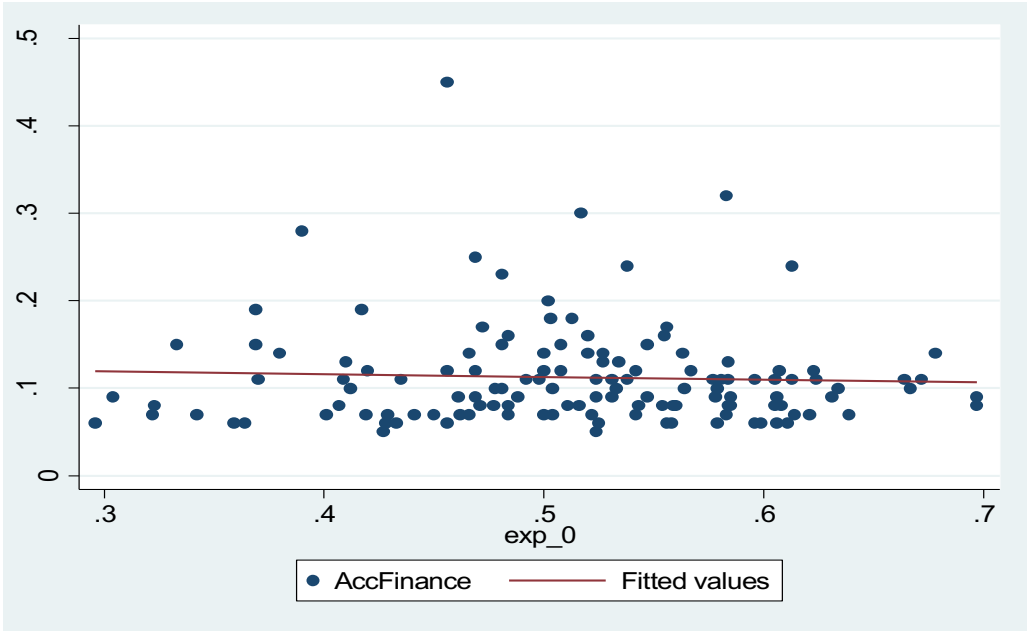
A similar scatter plot can be prepared with respect the age profile as well. Figure 6 presents the scatter plot of the difficulty in access to finance on y-axis and the share of firms with less than 5 years old in the x-axis. Dots represent the observations while strait line is the OLS regression fit. Again, there is positive relationship between these two variables indicating that younger firms face higher incidence of difficulties in accessing to finance. This finding supports the Hypothesis 2 of the thesis.

Figure 6: Relationship Between Problems in Access to Finance and Firm Age



Lastly, a similar relationship can be checked with respect to the firm's exporter status. Figure 7 presents the scatter plot of the difficulty in access to finance on y-axis and the share of firms with zero exports in the x-axis. Dots represent the observations while straight line is the OLS regression fit line. The fitted line between access to finance with the share of firms with no exports is almost flat. This finding is in line with the low correlation coefficients of the exporter status variable presented above in Table 3, and indicates that there is no clear relationship between difficulty in access to finance and exporter status.

Figure 7: Relationship Between Problems in Access to Finance and Exporting



Overall, the initial evidence in terms of cross correlations and scatter plots indicate that there is a clear relationship of difficulty in access to finance with age and size. However, the relationship with the exporting status is not very clear. These findings can be interpreted as indicative and valuable initial knowledge before starting to analyze. Establishing the relationships more formally would require more robust analysis such as regression methods. Such methods are implemented in the following sections.

6 Methodology

Three hypotheses about the association of age, size and export status with the difficulty of access to finance will be examined using quantitative methods. Specifically, some regression models will be employed to test the related hypotheses. In contrast to the empirical studies that use balance sheet data using micro-founded equations like Euler Equation approach, there are not yet any well-established equational forms used with survey data. So, the empirical methodology will follow the relevant papers that use the same survey data of the SAFE.

One crucial point in employing the appropriate technology and regression methods is about the type of dependent and independent variables. The SAFE data is built on firm level data for more than 30 countries. In the firm level data, each firm is asked questions on some properties like whether it is micro, small or medium size, or whether it faces difficulty in access to finance or not. The answers to these questions are some categories like dummy variables with yes or no answers (like a firm is micro sized or not, and it faces difficulty in access to finance or not). Then, if the analysis is conducted at the firm level, it would be appropriate to use regression methods that are suitable to categorical variables like probit or logit regressions. Many of the papers that use firm level data (Banerjee, 2014 and Ferrando et al., 2017) employ such methods.

However, as this thesis uses not the firm level data but the publicly available aggregated data at the country level, the nature of variables change. For example, instead of a categorical variable in the form of a firm being micro sized or not in the firm level data, country level data has the share of firms in the sample as the relevant variable. In other words, for the micro size variable, the data set has the percent share of micro sized firms in the whole sample for a given year, with a possible range from 0 percent to 100 percent. This property can be also seen from the summary statistics in Table 2.For example, average share of micro

sized firms in the whole sample of 199 observations is 44 percent with a range from minimum of 27 percent to a maximum of 69 percent. Therefore, the variables in country level data are in interval form in contrast to categorical form in the firm level data. As interval variables are a class of continuous variables, then using logit or probit models are not feasible any more, and instead pooled OLS, fixed effects and dynamic GMM methods are implemented in this thesis to increase the robustness of the analyses.

In terms of the econometric approach, the thesis will first implement pooled OLS method. The data set has information on country level through different years. So, using pooled OLS implies that time dimension or dynamics over time are not taken into account in the empirical analysis but observations in different time periods are considered as just some additional data points. Under this framework, the following simple equation will be estimated using OLS regression methods:

$$AccessFinance_i = \beta_0 + \beta_1 Size_i + \beta_2 Age_i + \beta_3 ExportStatus_i + \beta_4 Controls_i + \varepsilon_i$$

$$i = 1, 2, 3, \dots, 199.$$

Where*AccessFinance* is the share of firms experiencing difficulty in access to finance, *Size* is the relevant variable on size in the form of micro, small and medium, *Age* is the relevant variable on age in the form of different age intervals, and *ExportStats* shows the exporting condition of the firm. *Controls* refers to some variables like credit history, employment growth and turnover growth which can be also used as control variables in the regression analysis. Then, the coefficients of β_1, β_2 and β_3 provide tests of Hypotheses 1, 2, and 3, respectively.

In the above method, all observations are treated as separate data points in the OLS regression (i.e. they are pooled together) so *i* ranges from 1 to 199. As an additional method, panel dimension (i.e. same country having different data points over time) can be utilized to

obtain more robust results. Then using some panel data methods like fixed can be employed. Additionally, if the possibility that associations of age, size and export status with the access to finance can be dynamic is taken into account, then dynamic panel data methods like dynamic GMM can be also used another method. In all these panel data methods, an equation in the following form would be estimated:

$$AccessFinance_{it} = \beta_0 + \beta_1 Size_{it} + \beta_2 Age_{it} + \beta_3 ExportStatus_{it} + \beta_4 Controls_{it} + C_i + Y_t + \varepsilon_i$$

$$i = 1, 2, 3, \dots, 34$$

$$t = 2011, 2013, 2014, 2015, 2016, 2017$$

In the panel data specification above, *i* refers to country and *t* refers to year of the observation. In addition to the standard variables, there are also two more variables in the equation which would increase the robustness of the results. First is the C_i, which is the country fixed effect and second is $Y_t$which is the year fixed effect. These fixed effects would control for the unobserved country or time factors in the analysis so that the robustness of the regression increases. In other words, country fixed effect addition is expected to eliminate any biases arising from the omitted country-specific factors and year fixed effect is expected to remove any time related factor. Both methods of pooled OLS and panel data are being executed using the reputable statistics software of named STATA.

7 Econometric Analysis

This section presents the results of econometric analysis that have been performed. Regression results are given in three sub-sections. Firstly, the full sample results with pooled-OLS, Panel Data and Dynamic GMM methods are presented. This part forms the core of the empirical analysis while the following part presents some details and robustness analyses. Second part adds some control variables to the regressions as well as looking at the details of access to finance problem. This part is especially valuable to understand the possible reasons and mechanism of the access to finance problem. Then, the third sub-section examines if there are some differences across countries. It specifically investigates whether the level and intensity of access to finance problem differs across low and high-income countries and across sovereign debt countries versus other countries.

7.1 Results of Pooled-OLS, Panel Data and Dynamic GMM Methods

Table4 presents the results for the dependent variable of access to finance using pooled-OLS method. This question in the SAFE survey specifically asks, “What is currently the most important problem your firm is facing?”. Then, firms have seven options of finding customers, competition, access to finance, costs of production or labor, availability of skilled staff or experienced managers, regulation and other. They choose only one of the options. The dependent variable in Table 4 is the share of firms choosing the option of access to finance. So, theoretically it can be between 0 and 1. In the first column of Table 4, size variables in terms of number of employees are used as the main explanatory variable. For the number of employees, the survey has three categories, with less than 10, between 10 and 50, and more than 50. The data are presented as the shares of this employment size, so their total becomes

1. To avoid multicollinearity problem, only first two categories are included in the regression. Results of the second column indicate that both categories of size are statistically significant and positive implying that as the share of small firms in a country increases, the share of access to finance being the most important problem rises. The third column examines the effect of age profile. Again, the last age category of more than 10 year is excluded from the regression due to multicollinearity. In the age profile, only the age group of between 5 and 10 years is found to be positive and significant implying the access to finance problems is higher for this category. Then the fourth column looks at the effects of exporter status and finds no effects of exporting on access to finance. Lastly, the fifth column puts all eight variables at the same time to the regressions in order to see the joint of age, size and exports, and find that only size variables stay statistically significant in this specification.

Table 4: Access to Finance and Firm Characteristics

Dependent Variable: Access to Finance is the Most Important Problem				
# of Empl.< 10	0.365***			0.461***
	(2.775)			(3.323)
# of Empl. bw 10 and 50	0.416*			0.522**
	(1.829)			(2.400)
Age <2 year		0.0527		0.0572
		(1.385)		(1.194)
2 years < Age < 5 years		0.0641		0.0701
		(0.520)		(0.368)
5 years < Age < 10 years		0.234**		0.0546
		(2.171)		(0.576)
0 Exports			-0.0473	-0.0893
			(-0.508)	(-1.310)
Exports <25%			-0.0849	-0.148
			(-0.592)	(-1.117)
25% < Exports < 50%			0.0583	0.0687
			(0.240)	(0.354)
Constant	-0.153	0.0776***	0.151*	-0.193
	(-1.255)	(5.429)	(1.725)	(-1.296)
Observations	199	189	131	131
R-squared	0.066	0.072	0.007	0.239

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As there are many sub-categories of age, size and exporting intensity, it can be practical to aggregate them to less groups to make the regressions more feasible. Towards this aim, age variable will be two categories with less than 5 years old and more than 5 years old. Similarly, size will be again two categories with less than 50 employees and more than 50 (and less than 250) employees. For the exporting intensity, two sub-groups are less than 25 percent exporting share of sales and more than 25 percent.

Table 5: Access to Finance Problem and Its Intensity

	Dependent Variable: Access to Finance is the Most Important Problem	Dependent Variable: Intensity of the Access to Finance Problem
# of Empl.< 50	0.420***	9.021***
	(3.656)	(4.946)
Age < 5 years	0.0543***	7.987**
	(3.233)	(2.213)
Exports < 25%	-0.106	-2.700**
	(-1.640)	(-2.205)
Constant	-0.130	-0.401
	(-1.523)	(-0.313)
Observations	131	101
R-squared	0.231	0.291

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

New categories of age, size and export level are used in the Table 5 regressions. As seen for the access to finance variable in the second column, size and age variables are found to be statistically significant while export variable is not significant. Positive coefficients imply that higher share of small and younger firms in a country increases the shares of firms with the most important problem being access to finance. Moreover, the coefficient of size is almost eight times of the coefficient of age. In other words, when the share of small firms in a country increases by one percentage points, the share of firms with the most important problem being access to finance increases by 0.4 percentage points, while the impact of same size increase in younger firms is only 0.05 percentage points. There is another question in the

SAFE survey related to the access to finance problem. It asks "How important have the following problems been for your enterprise in the past six months? Please answer on a scale of 1-10, where 1 means not it is not at all important and 10 means it is extremely important" and one of the options is access to finance. This question measures, in a sense, the intensity of the problem. This question is also used as a dependent variable in Table 5. Column three shows the regression results, and it is seen that both being small and young increases the intensity/importance of problem significantly. Additionally, it is found that having less than 25 percent export share decreases this intensity. Interpreting the coefficient is slightly different than the level of access to finance variable. The scale of the second variable is between 1 and 10, while the independent variables are between 0 and 1. Then 1 percentage points (i.e. 0.01) increase in, for example, the share of small firms leads to 9*0.01=0.09 points increase in the intensity of the access to finance problem.

Table 6: Panel Data and Dynamic Methods

Dependent Variable: Access to Finance is the Most Important Problem		
	Fixed Effects	Dynamic GMM
Lag of Dependent Variable		0.562***
		(4.791)
# of Empl.< 50	-0.120	0.345
	(-0.50)	(1.130)
Age < 5 years	0.0555***	0.0321***
	(4.94)	(3.195)
Exports < 25%	-0.0170	0.00537
	(-0.26)	(0.0608)
Constant	0.199	-0.227
	(1.22)	(-0.891)
Observations	131	93
R-squared	0.380	
Number of id	34	33

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As additional robustness analysis, Table 6 repeats the pooled-OLS results with panel data and dynamic GMM methods. Dependent variable is again the level of access to finance problem. Second column presents the results of fixed effects and third column presents the results of dynamic GMM methods. Dynamic GMM specification allows the dependent variable to have a dynamic structure with its one lag being included in the regressions. Moreover, one lag of independent variables is used as an instrument to contain the endogeneity problem. So, this can be considered as an important robustness of pooled-OLS results. However, before taking dynamic GMM results into the account, one should note that as lags are used in the instruments list, the sample size decreases significantly from 131 to 93. Results indicate that there is a dynamics structure in the access to finance problem, namely having a problem in the previous problem is a strong indicator of having a problem in the current period as well. Additionally, out of age, size and export variables, only the age variable is found to be statistically significant in both specifications. Overall, methodological robustness analyses that are performed show that age is the most robust predictor of access to finance problem.

7.2 Control Variables and Details of Access to Finance Problem

Once the baseline regressions are established in the previous sub-section, this part conducts further robustness analysis with the addition of some control variables and investigates the details of financing problem with further related questions, such as being family owned, having high sales and employment growth, which is thought to have effects on access to finance of SMEs.

Table 7: Addition of Control Variables

	Dependent Variable: Access to Finance is the Most Important Problem		Dependent Variable: Intensity of the Access to Finance Problem	
# of Empl.< 50	0.324***	0.332***	5.014***	5.187***
	(2.782)	(2.925)	(2.837)	(3.048)
Age < 5 years	0.0482***	0.0486***	9.679***	5.606*
	(3.500)	(3.601)	(3.968)	(1.919)
Exports < 25%	-0.109	-0.102	-3.508***	-2.912***
	(-1.640)	(-1.566)	(-3.469)	(-2.929)
Family Owned	0.0855	0.0902	5.206***	4.576***
	(1.153)	(1.250)	(4.555)	(4.091)
High Empl. Growth		0.205**		1.780
		(2.240)		(1.195)
High Sales Growth		0.00927		1.895
		(0.113)		(1.648)
Constant	-0.104	-0.138*	-0.625	-0.863
	(-1.232)	(-1.665)	(-0.472)	(-0.676)
Observations	131	131	101	101
R-squared	0.243	0.297	0.419	0.473

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7 presents the results for the level and intensity of access to finance problem. The usual variables of age, size and exports are included in the all specifications. Then, in columns two and four, the new variable of family owned business is added while in columns three and five, the variables of high sales growth and high employment growth are also added to the regressions. The variable for the share of family owned firms is added to see whether such firms experience more difficulty in access to finance, as these firms might have less institutional and professional managements. High growth variables are also added to see whether in strong growth periods firms would face higher financing constraints. For the level of access to finance problem in columns two and three, both size and age variables are still statistically significant while out of additional control variables only high employment growth is significant in third column. This implies that during high growth of workforce, some firms might be subject to higher levels of access to finance problem. For the other dependent variable of the intensity of access to finance problem, age and size are still significant. Additionally, exports are found to be decreasing the intensity. Regarding the additional

control variables, only the family ownership is statistically significant leads to higher intensity of problem and the other control variables are statistically insignificant. Overall, additional control variables improve the explanatory power of regressions, and while high employment growth is found to increase the level of access to finance problem, family ownership is found to increase the intensity of the access to finance problem.

Findings until now show that age is the most robust predictor of access to finance problem, with being statistically significant in all of the specifications. Then, size is also a robust indicator that comes second, being robust in majority of analysis. Exports are only seen significant for the intensity of the problem in a negative way, which indicates that being an exporter has a negative relationship with the intensity of the access to finance problem. Additionally, growth is important for the level of access to finance problem, while being a family business actually increases the intensity of this problem. Then understanding the possible reasons for these relationships can also become important questions for further research. There is some further information in the SAFE survey that can be used to get a grasp of the mechanisms of access to finance problem. Specifically, there are six other related questions in the SAFE Survey. One collects information on the recent developments in credit history, namely the portion of firms for which credit history deteriorated recently, and in collateral requirements, namely the share of firms for which collateral requirements increased. Then, the next three questions are asking whether firms face difficulty in finding enough collateral, whether the interest rates in the market are too high for them (some sort of price or interest rate rationing), or whether there is no financing available (i.e. quantity rationing). Finally, the last question collects information on the share of firms which state that they do not face any difficulty in financing at all.

Table 8: Details of Access to Finance Problem – Pooled OLS Regressions

	Credit History Deteriorated	Collateral Requirements Increased	Difficulty in Collateral	Interests too High	No Financing Available	No Difficulty in Finance
# of Empl.< 50	0.466***	0.446**	-0.0859	0.580***	0.580***	-0.625**
	(5.766)	(2.387)	(-0.926)	(3.250)	(3.113)	(-2.312)
Age < 5 years	0.0496***	0.132***	0.0349***	0.0519*	0.0311**	-0.139***
	(4.752)	(4.320)	(2.690)	(1.754)	(2.114)	(-4.658)
Exports < 25%	-0.0253	-0.196	-0.0793	-0.0788	-0.0171	0.0154
	(-0.606)	(-1.388)	(-1.243)	(-0.672)	(-0.282)	(0.0973)
Constant	-0.275***	0.00843	0.271***	-0.206	-0.358***	0.827***
	(-4.240)	(0.0477)	(3.460)	(-1.618)	(-2.682)	(4.498)
R-squared	0.429	0.186	0.081	0.091	0.226	0.168

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8 presents the pooled-OLS results of these detailed and additional questions on the access to finance problem. For the dependent variable of deteriorating credit history, both being small and young are found to be statistically significant. The related coefficients are very similar to the benchmark case in column two of Table 5. Regarding the higher collateral requirements in third column of Table 8, it is seen that being small and young are again statistically significant predictors while the coefficient of age is much higher in this specification. Another related question about collateral is the difficulty in finding enough of it for access to finance purposes. Fourth column of Table 8 shows that for this difficulty on being small matters while size is not found to be significant. This is an interesting finding in the sense that size variable, which is a very robust predictor in all other specifications, is not found to be associated with the difficulty of finding collateral. Then for the questions of interest rates being too high or no financing being available, both size and age are found to be significant determinants. Then, the last column of Table 8 has a question in an opposite spirit. It collects information on the proportion of firms which say that they do not face any difficulty in getting financing. Then, based on the theoretical arguments in the literature review and empirical research (including the above tables) parts, it can be expected that being small and young would have negative association with this variable. Actually, the last column

of Table 8 confirms these assertions with both age and size being negative and statistically significant. So, Table 8 presents very valuable information on the possible channels or mechanism of age and size on the access to finance problem. Moreover, in terms of the explanatory power, as measured by R-squared, it is seen the highest explanatory power is for the credit history while the lowest power is for difficulty of getting enough collateral.

Table 9a: Details of Access to Finance Problem - Fixed Effects Regressions

	Credit History Deteriorated	Collateral Requirements Increased	Difficulty in Collateral	Interests too High	No Financing Available	No Difficulty in Finance
# of Empl.< 50	0.265	-0.231	0.226	0.639	-0.499***	0.193
	(2.58)	(-0.72)	(1.39)	(1.64)	(-4.19)	(0.71)
Age < 5 years	0.0499***	0.135***	0.0407***	0.0654***	0.0214*	-0.145***
	(5.78)	(7.36)	(5.24)	(4.58)	(1.99)	(-8.19)
Exports < 25%	-0.0200	-0.0683	0.0819	-0.0197	-0.132	0.0572
	(-0.35)	(-0.41)	(1.14)	(-0.16)	(-1.38)	(0.32)
Constant	-0.132	0.410	-0.0799	-0.296	0.523***	0.196
	(-1.24)	(1.40)	(-0.69)	(-0.90)	(5.55)	(0.70)
Observations	131	131	131	131	131	131
R-squared	0.385	0.444	0.184	0.264	0.162	0.544
Number of id	34	34	34	34	34	34

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Given the importance of results in Table 8 regarding the details of access to finance problem, Table 9a presents a robustness analysis in terms of panel data methods of fixed effects regressions, with clustered errors. Fixed effect regression is expected to remove any biases coming from the omitted country-specific factors. So, the related results would be more robust compared to pooled OLS regressions. Age is found to be statistically significant for all dependent variables in Table 9a. For the first five regressions, the positive coefficient of age implies that young firms face a variety of financing problems, ranging from difficulty of having enough collateral to interest rates being too high. Moreover, being young is negatively associated with having no financing problem in a statistically significant way as shown by the last column of Table 9a. In contrast to this strong effect of age, the impact of size almost

disappears in fixed effect regressions. For the dependent variables of deteriorating credit history, rising collateral requirements, difficulty in having enough collateral, and the interest rate being too high, size variable is found to be statistically insignificant. Moreover, for the dependent variable of having no available financing, size is found to be negatively related, which is somewhat puzzling. So, overall the results of fixed effects regressions support the strong role of age or being a young firm in accounting for the details of access to finance problem.

Table 9b: Details of Access to Finance Problem - Dynamic GMM Regressions

	Credit History Deteriorated	Collateral Requirements Increased	Difficulty in Collateral	Interests too High	No Financing Available	No Difficulty in Finance
Lag Dep Var	0.682***	0.465***	0.17	0.208*	-0.0319	0.136
	(5.567)	(3.299)	(1.24)	(1.682)	(-0.291)	(1.218)
# of Empl.< 50	0.736***	-1.144	-0.387	1.229**	-0.457	-0.064
	(2.59)	(-1.470)	(-1.103)	(2.255)	(-1.442)	(-0.107)
Age < 5 years	-0.105	-0.851*	0.0385***	0.0527***	0.0223**	-0.147***
	(-0.702)	(-1.920)	(3.833)	(3.14)	(2.458)	(-9.555)
Exports < 25%	-0.0788	-0.748***	0.0623	-0.0117	-0.12	0.148
	(-0.918)	(-2.963)	(0.611)	(-0.0752)	(-1.244)	(0.903)
Constant	-0.470**	1.539**	0.356	-0.775*	0.485*	0.277
	(-2.006)	(2.429)	(1.239)	(-1.740)	(1.872)	(0.584)
Observations	63	63	92	93	93	92
Number of id	33	33	33	33	33	33

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As mentioned about Table 6 above, even after conducting fixed effects regressions, there might be some dynamic structure and endogeneity/simultaneity biases left in the regressions. One further robustness analysis to correct these problems to some extent would be to implement dynamic GMM. With this method, a dynamic relationship is allowed in the dependent variable. Additionally, one lag of independent variables is used as instruments for the independent variables, which are expected to lessen possible endogeneity issues. Moreover, the effective time length is around 3 or 4 years in the sample, so the sample has small-T and medium sized N (33). In such cases, using dynamic GMM also becomes more

appropriate. So, Table 9b presents the results of dynamic GMM method. It is seen that for three dependent variables (credit history deterioration, collateral requirement increasing and interest rates being too high), lag dependent variables are significant, validating that dynamic structure is appropriate for these variables.

Results of Table 9b indicate that both size and age matter some variables of interest. For example, being a young firm increases the difficulty level in collateral requirements, causes interest rates to be too high at a larger rate and increases the possibility that no financing is available. Similarly, being a small firm is associated positively with higher level of credit history deterioration and it also causes interest rates to be too high at a larger rate. So, the results of dynamic GMM methods support the result of pooled OLS and fixed effects methods. Overall, size and age are found to be the most important variables determining the level of financing constraints.

7.3 Cross Country Differences

In addition to the details of the access to finance problem, another important contribution of this thesis is the investigation on cross-country differences. As the SAFE data includes a total number of 34 countries, displaying the possible differences in access to finance problem for these countries becomes an important point to question. During the analysis, countries can be classified into different groups and then the differences across these groups can be checked. A further analysis would be to check the effects of individual countries, however limited number of years (namely five years) is an important obstacle to conduct such analyses because sample size for an individual country is very limited. Therefore, this part conducts first comparisons based on high vs. low income levels and then across sovereign debt problems.

In Table 10, countries are separated into two groups based on the GDP per capita levels. First group is defined as the high-income countries including Austria, Belgium, Croatia, Czech, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Sweden, UK and Iceland, while remaining countries are defined into the group of relatively lower income per capita. Then, differences across these two groups of countries in the benchmark pooled-OLS regressions are presented in Table 10.

Table 10: Differences Across High and Low-Income Countries

	High Income Countries	Low Income Countries	High Income Countries	Low Income Countries
	Dependent Variable: Access to Finance is the Most Important Problem		Dependent Variable: Intensity of the Access to Finance Problem	
# of Empl.< 50	0.163***	0.576***	5.638***	10.17***
	(3.115)	(3.363)	(3.755)	(3.919)
Age < 5 years	0.0447***	0.0932**	-3.187	9.754**
	(4.936)	(2.243)	(-0.730)	(2.113)
Exports < 25%	0.0737**	-0.229*	-0.223	-2.390
	(2.237)	(-1.885)	(-0.158)	(-1.287)
Constant	-0.0911***	-0.143	0.574	-1.271
	(-2.701)	(-0.968)	(0.660)	(-0.578)
Observations	76	55	57	44
R-squared	0.369	0.312	0.219	0.353

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As can be seen from Table 10, both size and age continue to be important for variables for the level of access to finance problem and its intensity. However, there are major problems across high and low-income countries. In the first two regressions, in which the dependent variable is the level of the access to finance problem, size is statistically significant at 1 percent level for both country groups. However, the coefficient is 0.16 for high income countries, while it is 0.58 for low income countries. These numbers compare to the combined sample coefficient of 0.42 in Table 5. So, being a small firm is much more (close to four

times) effective in increasing the access to finance problem in low-income countries. Namely, one percentage point increase in the share of small firms would lead to a 0.58 percentage points increase in the share of firms with access to finance being the most important problem in low income countries, while it leads to a 0.16percentage points increase in high income countries. In a similar fashion, the impact of being a young firm in Low Countries is more than twice that of high income countries. So, there exists major differences in terms of age and size effects on the level of access to finance problem in low and high-income countries, with low income countries being more prone to such problems. When the impact on the intensity of the access to finance problem is examined in the last two columns of Table 10, similar patterns are observed. The impact of size is almost two times larger in low income countries relative to high-income countries. Moreover, age variable is not significant for high income countries while it is large and significant for low income countries. These results show that there are major differences across low vs. high income countries, with access to finance problems being much more acute for low income countries.

Another dimension, for which cross country differences are examined, is the sovereign debt crisis that was experienced in some European countries, especially in 2011 and 2012. It can be argued that this crisis affected the financial conditions significantly in related countries, so the results of the analyses conducted in this thesis can differ on this dimension as well. For example, Ferrando et al. (2017) finds that countries that faced sovereign debt crisis, have firms more likely facing significant financial constraints, as well as they find that less creditworthy firms (including young and small firms) are still credit constrained. To be able to test this hypothesis, sample is classified into two groups as crisis and non-crisis countries. The countries that have faced sovereign debt crisis are namely Cyprus, Greece, Ireland, Italy, Portugal, Spain, and Iceland, while the remaining countries are non-crisis countries. Table 11 presents the results of related regressions for these two groups of countries.

Table 11: Differences Across Sovereign Debt Crises

	No Sovereign Debt Crises	Sovereign Debt Crises	No Sovereign Debt Crises	Sovereign Debt Crises
	Dependent Variable: Access to Finance is the Most Important Problem		Dependent Variable: Intensity of the Access to Finance Problem	
# of Empl.< 50	0.0911	0.483*	5.114**	10.34**
	(0.970)	(1.847)	(2.331)	(2.455)
Age < 5 years	0.0390***	0.0745	7.961**	10.71
	(3.054)	(1.635)	(2.119)	(0.658)
Exports < 25%	-0.0596	-0.649	-2.824**	-2.840
	(-1.156)	(-1.606)	(-2.091)	(-0.706)
Constant	0.0689	0.256	2.452*	-1.262
	(0.973)	(0.693)	(1.706)	(-0.287)
Observations	103	28	80	21
R-squared	0.142	0.304	0.181	0.370

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Overall, the results show that there are major differences across country groups. For instance, the size variable is insignificant for non-debt-crisis countries in terms of its effect on the level of the access to finance problem, while it is large and significant for crisis countries. Similar differences are also observed for the effect on the intensity of the access to finance problem. While the size is significant for both sovereign debt crisis and non-debt-crisis countries on the intensity of the access to finance problem, coefficient of the countries that face sovereign debt crisis during 2011 and 2012 is more than double of the no crisis countries coefficient. Regarding the impact of age variable, sizes of coefficients for crisis countries are larger while these coefficients are not statistically significant. One possible reason for this insignificance can be the small size of sample for crisis countries. Given the limited number of observations in this group, it becomes somewhat difficult to make strong conclusions. Moreover, given the small sample sizes in some sub groups (like 21 observations in sovereign debt crisis countries in Table 11 or 44 observations in low income countries in Table 10), implementing dynamic GMM is not feasible any more. As dynamic GMM would use one lag of variables as instruments, there would be very limited number of observations left to conduct the related regressions. So, only pooled OLS results are presented in this sub-section.

8 Results and Remarks

This part summarizes the results of previous section, which provide detailed econometric analyses of the access to finance problem. Three main hypotheses of this thesis are the positive effects of age, size and export status on the access to finance problem, namely the proposition that as firms get larger, older and more export oriented, their problems in access to finance would lessen. There are strong evidences regarding the effects of first two variables of age and size. Results imply that countries with higher shares of younger and smaller firms have also higher shares of firms which state that access to finance is the most important problem they are currently facing. Additionally, the intensity of this problem, measured by the importance assigned to by firms on a scale from 1 to 10, is also positively associated with the share of small and young firms. However, the third hypothesis on the positive effects of being an exported improving the access to finance problem is not supported with most of the related variables in the regressions analysis having insignificant coefficients. Findings until this part are in line with the results of the related literature studying the financial constraints.

This thesis differs from the existing studies by conducting some robustness analysis in terms of alternative methods, adds further control variables to the regressions, makes a detailed examination of possible mechanisms and channels for the problem and last but not least documents some cross-country differences. In terms of the methodological robustness, panel data methods of fixed effects, and dynamics GMM approaches are used. These results show that the age variable is always significant and positive implying that as the share of young firms in a country increase, the share of firms with the access to finance problem also rises. Regarding the addition of further control variables, in these cases both variables of size and age continues to be statistically significant. Moreover, high growth in terms of employment is found to increase the level of the access to finance problem while family

ownership increases the intensity of the same problem. These are quite interesting results and conducting further research on the possible mechanisms of these channels would be very valuable.

A major contribution of this thesis is the detailed analysis of channels and mechanisms through which size and age would affect the access to finance problem. For this topic, six more questions related to financing constraints are examined. These questions or information are whether credit history deteriorated in the recent periods, whether collateral requirements are increased by banks, whether firms face difficulty in finding enough collateral or they face interest rates that are too high, and then whether there is actually no funding available. Then, the last question examines whether age and size are effective in the firm response of no financial problem. Related regression analyses show that age is always significant and positive in all regression specifications including pooled-OLS and fixed effects models. However, size variable is significant in pooled-OLS methods, while they are mostly insignificant in fixed-effects regressions. So, the model produces very strong results in favor of age variable. In other words, the higher share of young firms in a country leads to the higher share of firms with credit history deterioration, with higher requirement of collateral, with more difficulty of finding enough collateral, with too high interest rates and with no financing availability. Moreover, being young is also negatively associated with the share of firms that state there is no financial problems that they face. These channels are very crucial to investigate why being small and young might be affecting the financing constraints through various mechanisms. So, this paper provides valuable information on the channels of financial constraints.

Another important contribution of this thesis is the illustration of cross-country differences. As the full sample contains 34 countries with very diverse characteristics, investigating some differences across sub-groups of this sample can be expected to provide

valuable lessons for researchers and politicians. The thesis specifically examines the effects of two classifications, first one being low versus high income countries and second being the impact of sovereign debt crises in some European countries. Results show that the shares of young and small firms have larger effects on the worsening of the access to finance problem as well as its intensity for low-income countries. Results show that lower-income countries face credit constraints in more acute ways. In the second comparison, similar results are found for sovereign debt crisis countries as well. Therefore, taking the cross-country differences into account in the case of financial constraints also seems to be important and valuable for related policy and academic research. Further financial policy and economic strategy suggestions for policymakers are presented in the following section.

9 Suggestions

In the light of the findings of this thesis, we know that age and size both matter while accessing to finance for SMEs. Therefore, it is necessary for the policymakers to take these results into the account while giving a decision related to SMEs and particularly related to their access to finance or credit. In other words, governments should be aware of the importance of the SMEs to the economy as a whole since SMEs provide huge amount of value added, employment etc., and should implement strategies to solve or at least ease the access to finance problem.

Turkey is a good example of a country which has a government that supports and tries to make the SMEs' credit facilities much healthier by taking into account that SMEs are so-called life-blood for an economy (Kredi Garanti Fonu , 2017).Particularly, Turkish banking sector has been playing very important role on solving the access to finance problem by granting special loans with special terms to the SMEs that has been providing the 75 percent of the total employment in the country and enabling around the 60 percent of the country's total exports. These Turkish banks including the biggest ones, namely Turkiye Is Bankasi, Garanti Bankasi. Ziraat Bankasi, Halkbank, Vakifbank and QNB Finansbank, have been serving these special-termed loans to their SME customers for years with the support and advises of the Turkish government. According to the Republic of Turkey Ministry of Customs and Trade (2017), the amount of Turkish banks' lending to SMEs in 2016 has become 7 times more than in 2006 and has been increasing more than the total personal loan amount.

Besides granting the credit, these banks provide mentorship, or in other words consultancy, for the firms regarding the proper use of the borrowings, orientation and adaptation to a new country or a market and many. According to the Banking Regulation and

Supervision Agency of Turkey (BDDK) reports[5], Turkish banks granted 125.5 billion Turkish Lira of loan to the SMEs in 2010, while in 2016 the amount increased to 401.6 billion Turkish Liras. Moreover, approximately 31 percent of the Turkish banks' commercial loans are granted to the SMEs as per the latest announcement made on August 2017.

In fact, Turkey's SME support strategies have started much earlier, by establishing an institution named Credit Guarantee Fund (KGF) in 1991, in order to act as a guarantor to the SMEs and to provide collateral support to the them which have creditworthiness before with the banks but don't use credit due to the lack of necessary collaterals as per KGF's pre-defined vision[6]. The fund has been established as a joint-stock company having 32 different shareholders, including the Turkish banks granting loans directly to the SME which have 1.53 percent share each, with around 320 million Turkish Liras current capital. Lately in 2017, Turkish government has decided to increase the resource provided by the Treasury to be used as a guarantee fund from 2 billion Turkish Liras to 25 billion Turkish Liras, which is in line with the growth objectives of Turkey Ministry of Development (MOD) stated in the Medium Term Program published since 2011[7]. As a result of these efforts, it is not a surprise that Turkey has been enjoying successful growth performance over the last years. According to World Bank[8], Turkey has been growing 6.6 percent yearly on average since 2011, which accounts for around 56 percent more GDP in 2017 than in 2010 that is driven by the SMEs. In the light of the Turkey example, first suggestion to ease the access to finance problem of SMEs, is for governments, specifically financial policymakers. They should find and implement SME-oriented strategies to ease the access to finance. These strategies may be

[5]Visit the BDDK's website to see the reports providing statistical data on monthly and yearly basis. https://www.bddk.org.tr/WebSitesi/english/Statistical_Data/Monthly_Reports/Monthly_Reports.aspx
[6]Visit the KGF's website to see the published activity reports providing valuable information on yearly basis https://www.kgf.com.tr/index.php/en/information-center/activity-reports
[7]Visit the MOD's website to see the recent publications providing statistical data http://www.mod.gov.tr/Pages/RecentPublications.aspx
[8]Visit the World Bank's website to see presenting statistical data of any country https://data.worldbank.org/country/turkey

lowering bureaucratic barriers, special-termed loans, credit guarantee facilities, mentorship like in the Turkey example. Additionally, valuation and consultancy for start-up projects could reduce the costs for starting up and provide the founder of the idea or project a better understanding, especially in the financial perspective. Last but not least, tax-free interest income for banks and stamp taxes exemptions for small firms could also help easing the access to finance, like China did recently. The People's Bank of China has announced that required reserve ratio will be reduced for commercial banks with the new loans or outstanding balance. If the bank has reached 1.5% in the total outstanding balance of loans or new loans in the previous year, their required reserve ratio will be cut by 0.5 percentage point, and if 10% has reached in the total outstanding balance or new loans in the previous year, their required reserve ratio will be cut by an additional 1 percentage point[9].

While Turkey has been dealing with the SMEs' access to finance problem successfully in the last years and granting much more credit facility to the SME; for example, "having a previous creditworthiness with banks" is a crucial requirement to be able to use the Credit Guarantee facility. Here, an important question arises: what will happen to the firm which does not have any bank record before? Indeed, the question itself raises the second suggestion afterwards: there should be a facility that keeps records of SMEs. Namely, a very possible and feasible solution would be a Europe-wide credit risk database particularly for SMEs, which will include start-ups, very young and small firms as well. In their paper very recently, Yoshino and Taghizadeh-Hesary (2017) work similar problem for Japan and give an institution as an example, which acts as an SME credit risk database in Japan to ease the financing for both lenders and SMEs. As per the authors; around April 2015,the database included around 2.2 million incorporated SMEs and 1.1 million sole-proprietor SMEs, which is by far the largest database in Japan that provides credit risk analysis, credits coring facilities

[9]Visit The People's Bank of China website to see the announcement
http://www.pbc.gov.cn/english/130721/3395934/index.html

as well as revealing the information of the SMEs' defaulting probabilities for banks and institutions that are guaranteeing the loan or credit (Yoshino and Taghizadeh-Hesary, 2017, p.21). In addition to help for credit guarantors, this database will ease the access to finance for SMEs, too. They will have fever bureaucratic boundaries while applying the loan and the chance of being rejected of a SME will decrease by enabling even the young firms "to gain access to the debt market by securitizing their claims" as the authors stated rather than leaving the credit-granting activity only for the banks to do.

Overall, there are two very important implementations that need to be done as a priority in order to ease the financing problem of SMEs: SME supporting strategies just like Turkey managed to do in the last 10 years and nation-wide credit risk database particularly that covers SMEs exclusively. Both suggestions would be able to provide less financially constrained business environment for the SMEs both young and small firms.

10 Limitations

This thesis studies an important problem of the economies and tries to give suggestions for it by making a very strong assumption that 10,712 enterprises included in the SAFE data set, namely Survey on the Access to Finance of Enterprises which is a survey conducted by both the European Commission and the ECB, will have an explanation power on the whole population of more than 24 million SMEs around the Europe. On the other hand, like many survey data, SAFE data suffers from problems such as subjective scaling, uncertainty about interviewee's honesty, closed-ended questions etc. Furthermore, specifically SAFE data set is on country-level rather than firm-level. Although the variables are in interval form presented as percentage on country-level, it leads the data to have a narrow sampling. Besides it has very detailed numerous questions regarding the financing conditions and characteristics of the firms, sample is 6 years long with between 131 and 199 observations for most variables. During the dynamic GMM estimation, this number even decrease below 30, as seen on Table 11, leading the dynamic GMM to be unfeasible. Lastly, the frequency of data may be counted as another limitation of the data since its on yearly basis. This characteristic may limit a researcher as well who is willing to conduct high-frequency analysis.

Overall, policymakers and further researches should take SAFE data's several deficiencies into the account before getting to strong conclusions, like this thesis does. A further researcher could use a firm-level survey data to increase the observations in the sample, or even try to find another data that includes more than around 11,000 enterprises within the population of 24 million.

11 Conclusion

The small and medium sized enterprises form the basis of many advanced and developing countries, including European Union countries. They are the main source of employment, and they contribute significantly to production, value added and exports. Given their importance, understanding the problems and challenges that SMEs face and designing policies to alleviate these problems has become important policy and research questions. This thesis particularly aims to investigate the possible determinants of one major problem of SMEs: access to finance.

The access to finance and credit constraints problem are found to be one of the most acute problems that SMEs face. There are extensive theoretical and empirical literatures examining the relevance of financial constraints form firms. In contrast to the perfect capital market assumption, many papers argue that there are several problems such as information asymmetries, moral hazard or principal-agent conflicts that would lead to imperfections in financial markets. In such cases, even if there are very profitable investment opportunities, the firms might not be able to reach financial funds to exploit these opportunities. So, access to finance can be an important obstacle in front of firms' growth and investment strategies.

The empirical literature also supports the arguments of the theoretical studies. It is usually found that firms in both advanced and developing countries face varying degrees of financial constraints. These problems are found to be more acute especially for small and young firms, as these firms are more prone to the aforementioned issues like information asymmetries and moral hazard issues. There are also papers using the SAFE database to examine financial constraints for SMEs in the Europe. They also find that young and small firms face higher frequency of access to finance problems.

After reviewing the related literature and displaying the important role of SMEs in the European economy, this paper forms three hypotheses in terms of the impacts of age, size and export status of firms. The third hypothesis is a less-studied topic in the literature and started attracting more recent attention. Thereby, the paper aims to document the determinants of financing constraints for the European SMEs.

The thesis conducts detailed regression analysis. In contrast to the papers that use probit or logit models to study SAFE database, this thesis employs fixed effects and dynamic GMM methods. As the country level data are used in the current analysis rather than detailed firm-level data, fixed effects and dynamic GMM methods become more appropriate than the probit or logit methods. Moreover, these methods also present some advantages like controlling for omitted country-specific fixed effects, accounting for dynamic structure in the access to finance problem and using instrumental variables to deal with endogeneity problem that might have occurred.

The results of the regression analyses show that age is the most predictor of access to finance problem and its intensity, with higher share of younger firms leading to higher level and intensity of access to finance problem. Size is also another important determinant with statistically significant results in many regressions specifications. However, no clear role of exporter status is found in the analysis.

To conclude, the thesis makes important contributions in terms of detailing the channels of access to finance like credit history, collateral requirements, ease of satisfying these requirements, too high level of interest rates, or no availability of financing. It is shown that age and size still mater for these channels. Lastly, some cross-country analysis shows that low-income countries as well as the countries which experienced sovereign debt crisis face the access to finance problem more strongly. These findings provide important contributions to the relevant literature along with significant policy implications.

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Appendix

Data set, STATA log, do and output files can be accessed on:

https://drive.google.com/open?id=18mehuWiAz-L-XDtaDS3BNzDaPKInMo_m